Depressive symptoms in an ethnically Diverse cohort of chronic dialysis patients:

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Chapter 3

Depressive and anxiety symptoms in Dutch native and immigrant dialysis patients

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ABSTRACT

Background

Due to continuing migration there is more interest in the mental health status of immigrants. The aim of this study is to determine the prevalence of depressive/anxiety symptoms in immigrant and native dialysis patients, and to explore if patient characteristics can explain differences.

Methods

For this cross-sectional study patients were selected from the DIVERS study, a prospective cohort study among chronic dialysis patients in the Netherlands. Regions of origin of immigrant patients were defined as African-South American, Asian and European. The Beck Depression Inventory and the Beck Anxiety Inventory were used. Differences between native and immigrant patients were explored using logistic regression models adjusted for patient characteristics.

Results

For 245 native and 249 immigrant patients the prevalence of depressive symptoms was 35 and 50% and of anxiety symptoms 30 and 42%, respectively. Crude ORs for depressive/anxiety symptoms for immigrant patients versus native patients were 1.8 (1.2–2.5) and 1.7 (1.2–2.5), respectively. After adjustment for patient characteristics ORs remained the same.

Conclusion

Clinicians should be aware that immigrant dialysis patients are more prone to develop depressive and anxiety symptoms. Cultural factors might play a role and should therefore be assessed in future research.

INTRODUCTION

Depressive symptoms are highly prevalent in dialysis patients with an estimated occurrence of 39% as was shown by a recent meta-analysis[1]. These symptoms are independently associated with mortality[2], hospitalization[3], and impaired health related quality of life (HRQOL)[4;5]. Depressive symptoms often co-occur with anxiety symptoms[6]. Anxiety symptoms are also highly prevalent in dialysis patients with a prevalence that varies between 13% and 50%[6-11]. Anxiety symptoms are also associated with impaired HRQOL[8] in dialysis patients, and seem to contribute to the relationship between depressive symptoms and impaired HRQOL[6].

Due to continuing migration there is more interest in the mental and physical health status of immigrants[12]. Depressive and anxiety symptoms have been found to vary between native and immigrant groups in a range of settings including the general population and several patients groups[13-16]. In chronic dialysis patients, however, it is unclear whether being immigrant is a risk factor for depressive and anxiety symptoms. A recent meta-analysis [1] showed that the prevalence of depressive symptoms does not seem to differ between white and non-white dialysis patients. However, the studies included in this meta-analysis [1] used ethnic origin but did not include immigrant status and were predominantly US dialysis populations. In these US dialysis populations ethnic origin is often divided in two major groups: African American or Black patients and Caucasian or White patients. In the Netherlands and in many European countries the ethnic and immigrant composition is rather different and diverse, compared to the US dialysis population[13;17].

The objective of this study is to determine the prevalence of depressive and anxiety symptoms in native and immigrant dialysis patients in the Netherlands. In addition, we explore if the prevalence of depressive and anxiety symptoms differs between regions of origin of the immigrant patients. Finally, we explore whether differences between dialysis patient groups can be explained by patient characteristics such as demographic and clinical parameters or physical status.

METHODS

Patients

For this study we used cross-sectional data of the "Depression related factors In dialysis patients with Various Ethnicities and Races Study (DIVERS), which is an observational prospective cohort study among dialysis patients in four urban teaching hospitals and one university hospital in the Netherlands. These hospitals were chosen because of the high percentage of immigrant dialysis patients. Patients were included between June 2012 and December 2013 (prevalent patients) or until October 2014 (incident patients). Patients were included when they were at least 18 years of age, were on dialysis treatment

for at least 90 days, and were able to fill out questionnaires in the Dutch, English, Turkish or Moroccan Arabic language. Patients were excluded if they had cognitive disabilities that interfered with filling out questionnaires. For the current analysis patients were also excluded if they did give permission for examination of their medical records but did not want to fill out questionnaires. The study was approved by the medical ethics committee of the VU university medical centre (approval number: 2010/064).

Patient characteristics

The following demographic and clinical data were obtained from medical records: age, gender, dialysis modality, date of starting dialysis treatment, comorbidity, primary cause of kidney disease, body mass index (BMI), and laboratory measures. Data on smoking status, country of birth, country of birth of both parents and grandparents, marital status, working status and education were collected through a self-report questionnaire. The primary cause of kidney disease was classified according to the codes of the European Renal Association-European Dialysis and Transplantation Association (ERA-EDTA)[18]. Co-morbid conditions were scored according to the Davies comorbidity index[19], resulting in a comorbidity index classified into: no, intermediate or severe. Laboratory parameters were collected from routine blood laboratory investigations performed in the individual dialysis centers. To determine patient's physical status we used the physical component summary score (PCS) of the Short Form 12 (SF-12). The SF-12 is a quality of life questionnaire, consisting of a physical and a mental component score. SF-12 is validated among dialysis patients [20].

Immigrant status

Patients were classified as native or immigrant based on the country of birth of the patients and of their parents. According to the standard definition of the Statistics Netherlands criteria an individual is considered to be an immigrant if at least one parent was born abroad, regardless of the individual's own country of birth. Patients who are born abroad with at least one parent also born abroad are first generation immigrant patients. Patients who are born in the Netherlands with at least one patient born abroad are second generation immigrants[21;22]. Patients of whom both parents were born in the Netherlands were classified as native. Moreover, immigrant patients were further classified into region of origin. Patients of whom at least one parent was born in Africa or South America were classified as African-South American immigrants. Patients of whom at least one parent was born in the Middle East or Asia were classified as Asian immigrants. Patients of whom at least one parent was born in Europe, other than the Netherlands, were classified as European immigrants. Surinamese patients of whom at least one grandparent was born in Asia were classified as Asian immigrant. All other Surinamese patients were classified as African-South American immigrant[22].

If both parents are born in different countries, the mother's country of birth is used to infer descent.

Depressive and anxiety symptoms

Depressive symptoms were measured using the Beck Depression Inventory (BDI)[23], and symptoms of anxiety were measured using the Beck Anxiety Inventory (BAI)[24]. Both questionnaires consist of 21 questions which are scored on a 0 – 3 scale. Patients were considered as having depressive and anxiety symptoms when they scored at least 13 points on the BDI[25] and 13 points on the BAI[26;27], respectively.

Statistical analyses

The three ethnic groups were compared in terms of patient characteristics, symptoms of depression, and anxiety symptoms using the analysis of variance F test or Kruskall-Wallis tests for continuous variables, and a Pearson's chi-square test for categorical variables. Mean with standard deviation or median with interquartile range was used, depending on the underlying distribution. Odds ratios were calculated using logistic regression to determine differences between immigrant groups in the prevalence of depressive and anxiety symptoms, and to determine whether differences between immigrant groups can be explained by demographic variables and clinical characteristics. Multivariable adjustment was done deliberately within the causal pathway in order to explain potential mechanism. We used gradually more extensive multivariable models with demographic and clinical variables, followed by psychosocial variables and the patients physical status.

To obtain complete datasets, missing values for both continuous and categorical variables were imputed with multiple imputation techniques (5 repetitions). With multiple imputation missing data are imputed by a value that is predicted using the patients available characteristics under the condition of missing 'at random'. Missing 'at random' means that the missing value probably depends on other observed patient characteristics. Parathormone, time on dialysis, Kt/V and ferritin were not normally distributed and therefore square root transformed to enter the multiple imputation model. Almost all variables had < 10% missing except for total cholesterol (18%).

A p-value < 0.05 was considered statistically significant. Patient characteristics, depressive and anxiety symptoms were calculated on both the original and imputed dataset. For all statistical analyses SPSS for Windows version 21.0 was used.

Sensitivity analysis

To test the robustness of the results, several sensitivity analyses were performed. Analyses were repeated (1) excluding second generation immigrants (2) excluding

patients who received help filling out the questionnaires, because these patients could give more socially accepted answers; (3) using different cut-off scores (≥ 14, ≥ 15 and ≥ 16) in our logistic regression models for both the BDI and the BAI; (4) immigrants stratified into Turkish, Moroccan, Surinamese from Asian descent, and Surinamese from African descent because these are the main immigrant group in the Netherlands[13]. Finally, patient characteristics were compared between patients who did and who did not fill out the questionnaires.

RESULTS

Patient characteristics

In total 554 dialysis patients were included the DIVERS study of whom 494 filled out questionnaires and were included in the current analysis (native n=245, immigrant n=249). Patient characteristics of the included native and immigrant patients are presented in table 1. Compared to native patients, immigrants were younger ($p < 0.01$), had a higher prevalence of diabetes ($p < 0.01$), had a lower calcium ($p < 0.01$), and have a different distribution in the cause of end-stage renal disease ($p < 0.01$). The immigrant group consisted of 108 African-South American patients, 114 Asian patients and 27 European patients. Moreover, two hundred and twelve patients (85%) were first generation immigrant patients. The mean length of stay in the Netherlands of these patients was 32 (± 14) years. The countries of origin of all patients are presented in supplementary table 1.

Depressive and anxiety symptoms

The prevalence of depressive and anxiety symptoms varied between immigrant groups (table 2). Thirty-five percent of native patients and 49% of all immigrants had depressive symptoms above threshold (44%, 59% and 33% for African-South American, Asian and European immigrants, respectively). Thirty percent of native patients and 42% of all immigrants had anxiety symptoms above threshold (41%, 47% and 22% for African-South American, Asian and European immigrants, respectively).

Logistic regression analysis immigrants versus natives

The crude OR for scoring above threshold for depressive symptoms using the BDI (≥ 13) for all immigrants versus native dialysis patients was 1.8 (1.2 – 2.5), which implicates that immigrants have a 1.8 higher chance of having depressive symptoms compared to native patients. After stepwise adjustment for demographic characteristics, clinical characteristics, co-morbidity, laboratory values, social characteristics and physical status, ORs remained the same (table 3). After dividing all immigrants in three regions of origin and compared them to natives ORs in the fully adjusted model were 1.6 (0.9 –

2.9), 2.8 (1.6 – 4.9) and 0.9 (0.3 – 2.3) for African-South American, Asian and European immigrants, respectively (table 3).

Table 1. Patient characteristics of 494 native and immigrant dialysis patients

	Native	**Immigrant**	
Socio demographic	**N=245**	**N=249**	**P-value**
Age, y	69.5 (13.8)	58.9 (15.3)	P < 0.01
Sex,% men	60	61	P = 0.81
Education, % low	41	40	p = 0.72
Married/living together, % yes	56	48	P = 0.06
Having children, % yes	76	79	P = 0.36
Employed, % yes	11	12	P = 0.84
Use of anti-depressants, % yes	9	10	P = 0.56
Clinical			
Incident, % yes	31	29	P = 0.60
Modality, % hemodialysis	89	90	P = 0.76
Time on dialysis, months	17.0 (5.0 – 45.0)	24.0 (6.0 – 65.0)	P = 0.07
BMI, kg/m2	27 (5.6)	27.2 (6.1)	P = 0.24
Current smoking, % yes	21	17	P = 0.29
Causes of ESRD, %			P < 0.01
Diabetes Mellitus	13	35	
Glomerulonephritis	13	9	
Renal vascular disease	30	25	
Other	45	31	
PCS	36.3 (10.5)	37.8 (10.8)	P = 0.06
Comorbidity			
Davies comorbidity, %			P = 0.06
No	31	23	
Intermediate	51	61	
Severe	19	16	
Diabetes Mellitus, % yes	34	50	P = 0.06
Cardiovascular disease, % yes	29	31	P = 0.15
Laboratory			
Albumin, g/l	36.6 (5.5)	37.5 (5.0)	P = 0.07
Hemoglobin, g/l	7.2 (0.8)	7.1 (0.8)	P = 0.47
PTH, pmol/l	26.9 (14.0 – 45.0)	30.0 (16.0 – 47.7)	P = 0.11
Ca, mmol/l	2.30 (0.14)	2.25 (0.18)	P < 0.01
Phosporus, mmol/l	1.59 (0.42)	1.63 (0.51)	P = 0.35
Ferritin, ug/l	340 (181 – 562)	365 (173 – 637)	P = 0.51
Cholesterol, mmol/l	4.2 (1.2)	4.1 (1.4)	P = 0.62
Kt/V	1.51 (0.47)	1.52 (0.47)	P = 0.84

Data presented as mean (standard deviation) or median (inter quartile range)
ESRD: End-Stage Renal Disease, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Summary

Table 2. Depressive and anxiety symptoms in dialysis patient divided in three ethnic groups

Depressive and anxiety symptoms	Native N=245	All immigrants N=249	Region of origin Africa-South America N=108	Asia N=114	Europe N=27
BDI ≥ 13 (%)	36	49	44	59	33
BDI total score*	11.2 (7.4)	14.7 (11.0)	13.8 (11.5)	16.5 (11.1)	10.7 (6.3)
BAI ≥ 13 (%)	30	42	41	47	22
BAI total score*	9.7 (8.5)	13.3 (11.3)	12.5 (11.3)	15.0 (12.0)	9.2 (6.1)

* Data presented as mean and standard deviation, BDI: beck depression inventory, BAI: beck anxiety

Table 3. Odds ratio's for depressive symptoms (BDI ≥ 13) for immigrants versus Native Asian versus native and African-South American versus native dialysis patients

Model	Variables tested	All immigrant versus native	African-South American versus native	Asian versus native	European versus native
1. Unadjusted	ethnicity	1.8 (1.2 – 2.5)	1.4 (0.9 – 2.2)	2.6 (1.6 – 4.1)	0.9 (0.4 – 2.1)
2. Demographic	Model 1 plus age and gender	1.9 (1.3 – 2.8)	1.6 (0.9 – 2.6)	2.8 (1.8 – 4.4)	0.9 (0.4 – 2.2)
3. Clinical	Model 2 plus BMI, dialysis modality, primary kidney disease, smoking, time on dialysis	1.8 (1.2 – 2.7)	1.5 (0.9 – 2.5)	2.6 (1.6 – 4.2)	1.0 (0.4 – 2.3)
4. Co-morbidity	Model 3 plus Davies co-morbidity score	1.8 (1.2 – 2.6)	1.5 (0.9 – 2.5)	2.5 (1.5 – 4.0)	1.0 (0.4 – 2.3)
5. Laboratory	Model 4 plus hemoglobin, calcium, albumin, phosphorus, PTH, ferritin, cholesterol and Kt/V	1.8 (1.2 – 2.8)	1.5 (0.9 – 2.6)	2.5 (1.5 – 4.2)	1.1 (0.5 – 2.7)
6. Social	Model 5 plus marital status, educational level, employment, children	1.8 (1.1 – 2.7)	1.4 (0.8 – 2.5)	2.4 (1.4 – 4.0)	1.2 (0.5 – 2.9)
7. Physical status	Model 6 plus PCS score	1.9 (1.2 – 2.9)	1.6 (0.9 – 2.9)	2.8 (1.6 – 4.9)	0.9 (0.3 – 2.3)

BDI: Beck Anxiety Inventory, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Summary

The crude OR for scoring above threshold for anxiety symptoms using the BAI (≥ 13) for all immigrants versus native dialysis patients was 1.7 (1.2 – 2.5). After stepwise adjustment for demographic characteristics, clinical characteristics, co-morbidity, laboratory values, social characteristics and physical status, ORs remained the same (table 4). After dividing all immigrants in three regions of origin ORs in the fully adjusted model were 1.9 (1.1 – 3.4), 2.2 (1.3 – 3.9) and 0.7 (0.3 – 1.9) for African-South American, Asian and European immigrants, respectively (table 3).

Table 4. Odds ratio's for anxiety symptoms (BAI ≥ 13) for immigrant versus native Asian versus native and African-South American versus native dialysis patients

Model	Variables tested	All immigrant versus native	African-South American versus native	Asian versus native	European versus native
Unadjusted	ethnicity	1.7 (1.2 – 2.5)	1.6 (>1.0 – 2.6)	2.1 (1.3 – 3.4)	0.7 (0.3 – 1.7)
Demographic	Model 1 plus age and gender	1.8 (1.2 – 2.7)	1.9 (1.1 – 3.1)	2.3 (1.4 – 3.7)	0.7 (0.3 – 1.8)
Clinical	Model 2 plus BMI, dialysis modality, primary kidney disease, smoking, time on dialysis	1.7 (1.2 – 2.7)	1.8 (1.1 – 3.1)	2.2 (1.4 – 3.7)	0.7 (0.3 – 1.8)
Co-morbidity	Model 3 plus Davies co-morbidity score	1.7 (1.1 – 2.6)	1.8 (>1.0 – 3.0)	2.1 (1.3 – 3.5)	0.7 (0.3 – 1.7)
Laboratory	Model 4 plus hemoglobin, calcium, albumin, phosphorus, PTH, ferritin, cholesterol and Kt/V	1.8 (1.2 – 2.8)	1.9 (1.1 – 3.3)	2.2 (1.3 – 3.7)	0.8 (0.3 – 2.2)
Social	Model 5 plus marital status, educational level, employment, children	1.7 (1.1 – 2.6)	1.7 (0.9 – 3.0)	2.0 (1.2 – 3.5)	0.8 (0.3 – 2.3)
Physical status	Model 6 plus PCS score	1.7 (1.1 – 2.7)	1.9 (1.1 – 3.4)	2.2 (1.3 – 3.9)	0.7 (0.2 – 1.9)

BAI: Beck Anxiety Inventory, BMI: Body Mass Index, PTH: parathyroid hormone,
PCS: Physical Component Summary

Sensitivity analysis

By excluding second generation immigrants differences between native and immigrant patients remained the same (data not shown). Twenty five percent of the patients needed help filling out the questionnaires. By excluding these patients differences between native and immigrant patients also remained the same (data not shown). After using different cut-off scores for BDI and BAI (≥ 14, ≥ 15 and ≥ 16), differences between groups became more pronounced when a higher cut-off for BDI or BAI was used. Furthermore, after selecting immigrants from Turkey, Morocco, Surinam from Asian descent and Surinam from African descent the prevalence of depressive symptoms was 56, 77, 70 and 44%, respectively and for anxiety symptoms 44, 71, 48 and 44%, respectively. Finally, no differences for patient characteristics were found between the 494 patients who did and the 60 patients who did not fill out the questionnaires (data not shown).

DISCUSSION

This observational study examined the prevalence of depressive and anxiety symptoms in native and immigrant chronic dialysis patients. Compared to native patients, immigrant patients were almost two times more likely to report depressive and anxiety symptoms. These differences were more pronounced in Asian patients followed by African-South American patients. No differences in the prevalence of depressive and anxiety symptoms were found between European immigrants and native patients. We showed that patients characteristics do not appear to explain the differences between groups.

Our cohort shows that immigrant dialysis patients have a higher prevalence of depressive and anxiety symptoms compared to native dialysis patients. A recent meta-analysis[1] showed no difference between white and non-white dialysis patients. However, in these cohorts ethnicity is reported instead of immigrant status which is not necessarily the same. Moreover, in the US general population, a lower prevalence of depressive symptoms was shown in immigrants compared to natives[28]. This contradiction could be explained by the differences in the ethnic and immigrant composition of many European countries compared to the US[12,16]. Conclusively, immigrant status seems to be a risk factor for developing depressive and anxiety symptoms in Dutch chronic dialysis patients.

Immigrant dialysis patients in our cohort were divided in three groups according to region of origin. The first group was from Africa-South America. African-South American immigrants dialysis patients have a slightly higher, but statistically not significant, prevalence of depressive symptoms than native patients. The second region of origin in our cohort was Asia. The Asian immigrant dialysis patients in comparison to native patients had the highest prevalence of depressive symptoms of all immigrant groups. To the best of our knowledge there are no studies who reported prevalence rates of depressive symptoms in Asian immigrant dialysis patients. Both African-South American and Asian patients have a higher prevalence of anxiety symptoms in our cohort. In the few studies that describe the prevalence of anxiety symptoms in dialysis patients differences between ethnic groups could not be made because of the small sample of different ethnic groups[6-11]. The third region of origin in our cohort was Europe. European immigrants does not seem to differ from native patients, but the sample size is small. In sum, in addition to immigrant status the region of origin seems to be important for assessing the risk of mental health problems in dialysis patients.

Socio-demographic and clinical patient characteristics could not explain the differences between immigrant and native patients as was shown by a series of logistic regression models. There could be several explanations for the difference between native and immigrant patients. First, perceived ethnic discrimination (PED) may be an explanation, because PED contributes considerably to depression in ethnic minority groups in the Netherlands. Second, it has been shown that less skills for living in the Dutch society, and more feelings of loss are associated with the presence of both depressive and anxiety

symptoms in immigrant chronic dialysis patients[29;30]. Finally, religion might play a role in the difference between immigrant and native patients[31-33]. Ramirez et al[32] showed that in dialysis patients religious struggle was independently associated with greater psychological distress and impaired HRQOL. For clinical research it is important to assess immigrant status besides ethnic origin, and in clinical practice it is important for nephrologists to be aware that immigrant patients are more prone to develop depressive and anxiety symptoms.

A few limitations should be noted for this study. First, the broad spectrum of countries used to define groups makes it difficult to generalize these results for specific immigrant groups. Generalisation is especially difficult for Turkish and Moroccan immigrants which are the main immigrant groups in the Netherlands. Second, the presentation of a depression and anxiety disorder could differ across cultures. However, the BDI was validated in a comparable multi-ethnic cohort of dialysis patients[25]. Third, some participants filled out the questionnaire with help which makes the risk that participants give socially accepted answers higher. However, differences between ethnic groups remained the same after excluding the patients who received help with filling out the questionnaire.

In conclusion, immigrant dialysis patients have a higher prevalence of depressive and anxiety symptoms than native dialysis patients. Differences between native and immigrant patients were more pronounced in Asian patients. Clinicians should be aware that immigrant dialysis patients are more prone to develop depressive and anxiety symptoms. Patients characteristics could not explain the differences between immigrant and native dialysis patients. Cultural factors might play a role and should therefore be assessed in future research.

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SUPPLEMENTARY MATERIAL

Supplementary table 1. Countries of origin of at least one parent of 494 dialysis patients included in the DIVERS study.

Native N = 245	Africa -South America N = 108	Asia N = 114	Europe N = 27
245 The Netherlands	52 Surinam*	46 Surinam*	14 Germany
	17 Morocco	32 Indonesia	3 Belgium
	12 Netherlands Antilles	16 Turkey	3 Poland
	5 Ghana	6 Pakistan	2 Portugal
	5 Somalië	5 India	1 Scotland
	3 Egypte	2 Afghanistan	1 Great Britain
	2 Colombia	2 Filippijnen	1 Slovakia
	2 Algerije	1 China	1 Romania
	2 Nigeria	1 Nepal	1 Italy
	2 Soedan	1 Armenia	
	1 Guinee	1 Iran	
	1 Eritrea	1 Irak	
	1 Liberia		
	1 Uruguay		
	1 Brasil		
	1 Sierra Leone		

* Surinamese patients of whom at least one grandparent was born in Asia were classified as Asian. All other Surinamese patients were classified as African-South American.